

## CLAIMS

1. An antenna including a feed network; four or more helical radiating elements, and four or more impedance matching elements each coupling a respective radiating element to ground in parallel with the feed network.
2. The antenna of claim 1 wherein each impedance matching element is a stub.
3. The antenna of claim 1 wherein each impedance matching element is an inductive element.
4. The antenna of claim 1 wherein each impedance matching element is a stub coupled to ground via a conductive short circuit connection.
5. The antenna of claim 1 wherein the antenna is a quadrifilar antenna having four radiating elements
6. The antenna of claim 1 including four feed lines each connected to a respective radiating element at a respective junction, wherein each impedance matching element is connected at a connection point located at or adjacent to the junction.
7. The antenna of claim 6 wherein the connection point is located on the radiating element adjacent to the junction.
8. The antenna of claim 6 wherein the connection point is located on the feed line adjacent to the junction.

9. The antenna of claim 1 further including a ground plane, wherein each impedance matching element couples a respective radiating element to the ground plane in parallel with the feed network
10. The antenna of claim 9 further including a substrate which carries the radiating elements on a first side and the ground plane on a second side.
11. The antenna of claim 10 wherein the substrate carries the impedance matching elements on the second side.
12. The antenna of claim 10 wherein each impedance matching element includes a plated-through hole passing through the substrate.
13. The antenna of claim 1 wherein the antenna is configured to transmit and/or receive circularly polarized radiation.
14. The network of claim 1 wherein the feed network is a microstrip feed network.
15. The network of claim 1, wherein the feed network includes a hybrid coupler.
16. The network of claim 15, wherein the hybrid coupler has no terminated port.
17. The network of claim 15 wherein the hybrid coupler is a ring hybrid.
18. The antenna of claim 1 wherein the feed network includes a  $180^\circ$  hybrid coupler having a feed port, a  $0^\circ$  port; a  $180^\circ$  port having an approximately  $180^\circ$  phase difference with the  $0^\circ$  port; a first antenna port coupled to the  $0^\circ$  port; a second antenna port coupled to the  $0^\circ$  port via a respective

phased line, the second antenna port having an approximately  $90^\circ$  phase difference with the first antenna port; a third antenna port coupled to the  $180^\circ$  port; and a fourth antenna port coupled to the  $180^\circ$  port via a respective phased line, the fourth antenna port having an approximately  $90^\circ$  phase difference with the third antenna port.

19. The antenna of claim 1 wherein the feed network has an output impedance between 45 and 55 ohms.
20. The antenna of claim 1, wherein the radiating elements each have substantially the same length.
21. The antenna of claim 1, wherein the radiating elements are each coupled to the feed network at one end, and open circuited at another end.